

CLAIMS

1. A targeting peptide comprising an amino acid sequence selected from the group consisting of:
- AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLALY, TYSLKSA, TSTMPSR, ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIR, SWNHARV, NHHHGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ, MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR, MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPPTST, MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL, AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP, MSQTPYARPQYV, MTSNPHLNPGPR, MGHNINIPRTPL, LSTPLPYDMRRS, MTRIQDSPYDLR, MSTPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSLPQ, MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLPPTSNTG, LSKPIHIPSSIG, CICRGVGCCLLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS, AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLQMTPPTPLL, THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPPRP, MMPPPTSLPSPS, LAQNPIYRAHPH, MQPRPQTLTPAS, LTVPVVPSFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHTILSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, for targeting a material to a cell.
2. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS, GILSPSH, MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

3. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH and MSSPGPA, or a derivate thereof.

5 4. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

5. A targeting peptide according to claim 1 wherein said peptide is up to 100
10 amino acids long.

6. A targeting peptide according to claim 1 wherein said cell is a vascular endothelial cell.

15 7. A targeting peptide according to claim 1 wherein said material to be targeted to a cell is selected from the group consisting of drug delivery vehicles, gene therapy vehicles, bacteria, non-ionic surfactant vesicles, microcapsules and vaccination products.

8. A pharmaceutical composition comprising a targeting peptide in association
20 with a vehicle, the targeting peptide comprising an amino acid sequence selected from the group consisting of:

AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLSALY, TYSLKSA, TSTMPSR,
25 ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV, NHWHGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ, MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR,

MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPPTST,
 MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL,
 AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP,
 MSQTPYARPQYV, MTSNPHLNPGR, MGHNINIPRTPL, LSTPLPYDMRRS,
 5 MTRIQDSPYDLR, MSTPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSLPQ,
 MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIPHIPSSIG, CICRGVGCCLLL,
 LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS,
 AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLQMTPPTPLL,
 THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPRP, MPPPTSLPSPS, LAQNPIYRAHPH,
 10 MQPRPQTLTPAS, LTVVPVSVFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHITLSTE,
 MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, the vehicle carrying a
 pharmaceutically active agent, and a pharmaceutically acceptable carrier.

9. A pharmaceutical composition according to claim 8 wherein said peptide
 15 comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV,
 LSNFHSS, GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ,
 or a derivate thereof.

10. A pharmaceutical composition according to claim 8 wherein said peptide
 20 comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV,
 LSNFHSS, GILSPSH and MSSPGPA, or a derivate thereof.

11. A pharmaceutical composition according to claim 8 wherein said peptide
 comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP,
 25 MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

12. A pharmaceutical composition according to claim 8 wherein said peptide is up
 to 100 amino acids long.

13. A pharmaceutical composition according to claim 8 wherein said pharmaceutically active agent is selected from the group consisting of a biologically active drug, a further peptide(s) and polynucleic acid.

5 14. A pharmaceutical composition according to claim 8 wherein the targeting peptide is in direct association with the vehicle carrying a pharmaceutically active agent.

15. A pharmaceutical composition according to claim 8 wherein the targeting peptide is indirectly associated with the vehicle carrying the pharmaceutically active agent.

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16. A pharmaceutical composition according to claim 8 wherein the targeting peptide is covalently bound to the pharmaceutically active agent.

15 17. A pharmaceutical composition according to claim 8 wherein said composition is used to treat mammals.

18. A pharmaceutical composition according to claim 17 wherein said composition is used to treat humans.

20 19. A method of targeting a material to cell, said method comprising bringing into association a targeting peptide comprising amino acid sequence selected from the group consisting of:

25 AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSSSEW, IPMHLHN, TSESPTV, YSLSRSL, NHLSALY, TYSLKSA, TSTMPSR, ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV, NHHWGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ,

MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR,
 MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPPTST,
 MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL,
 AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP,
 5 MSQTPYARPQYV, MTSNPHLNPGPR, MGHNINIPRTPL, LSTPLPYDMRRS,
 MTRIQDSPYDLR, MSTPPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSPQ,
 MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIPHIPSSIG, CICRGVGCCLLL,
 LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS,
 AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLQMTPPTPLL,
 10 THAMSHLDKAH, MAVQPNTSTSN, MAINDTYPPPRP, MMPPTSLPSPS, LAQNPIYRAHPH,
 MQPRPQTLTPAS, LTVVPVVSFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHTILSTE,
 MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, with the material to be
 targeted to form a complex and exposing the complex to a cell(s).

15 20. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS,
 GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a
 derivate thereof.

20 21. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS,
 GILSPSH and MSPPGPA or a derivative thereof.

25 22. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of MSLTTPPAVARP,
 MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

 23. A method according to claim 19 wherein said targeting peptide is up to 100
 amino acids long.

24. A method according to claim 19 wherein the cell to be targeted is a endothelial cell.

5 25. A method according to claim 19 wherein said endothelial cell is a vascular endothelial cell.

26. A method according to claim 19 wherein said method is performed *in vivo*.

10 27. A method according to claim 26 wherein said method is used to target a material selected from the group consisting of drug delivery vehicles, gene therapy vehicles, bacteria, non-ionic surfactant vesicles, microcapsules and vaccine products.

28. A kit comprising a targeting peptide comprising an amino acid sequence
15 selected from the group consisting of: AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLSALY, TYSLKSA, TSTMPSR, ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV,
20 NHHWGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ, MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR, MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPPTST, MTGSQQT LHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK,
25 MTPFPTSNEANL, AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP, MSQTPYARPQYV, MTSNPHLNPGPR, MGHNINIPRTPL, LSTPLPYDMRRS, MTRIQDSPYDLR, MSTPPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPTTPIPSLPQ, MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIPHIPSSIG, CICRGVGCCLLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS,

AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLSMQTPPTPLL, THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPPRP, MMPPTSLPSPS, LAQNPIYRAHPH, MQPRPQTLTPAS, LTVVPVSVFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHTILSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, for transfecting or identifying cell types *in vitro*.

29. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH, MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

30. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS, GILSPSH and MSPPGPA or a derivative thereof.

31. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

32. A kit according to claim 28 wherein said targeting peptide is up to 100 amino acids long.

33. A kit according to claim 28 wherein said targeting peptide further comprises a linking region for binding molecular groups.

34. A kit according to claim 33 wherein said molecular groups are selected from the group consisting of reagents, pharmaceutically active agents, vesicles, diagnostic markers and antibodies.

35. A method for screening targeting peptides capable of binding to an endothelial cell, said method comprising:

inserting a polynucleotide encoding a potential endothelial cell-binding peptide into an expression vector;

5 expressing the peptide;

conducting a pre-screening step with the expressed peptides using non-endothelial cells in order to select for the expressed peptides with reduced or negligible binding to the non-endothelial cells;

10 further screening the expressed peptides which exhibited reduced or negligible binding to the non-endothelial cells using endothelial cells; and

selecting for the expressed peptides which display selective and efficient binding to the endothelial cells.

36. A method according to claim 35 wherein said endothelial cells are human
15 endothelial cells.

37. A method according to claim 35 wherein said non-endothelial cells are selected from a group consisting on human vascular smooth muscle cells and hepatocytes.

20 38. A gene therapy vector, said vector comprising a targeting peptide as described in claim 1, a vehicle associated with the targeting peptide and a nucleotide sequence comprising the gene for targeting carried within said vehicle.

25 39. A method of treating a disease, said method comprising administering a pharmaceutical agent in association with a targeting peptide, said targeting peptide comprising amino acid sequence selected from the group consisting of:

AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLSALY, TYSLKSA, TSTMPSR,

- ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV, NHWHGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ,
- 5 MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR, MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPPTST, MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL, AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP, MSQTPYARPQYV, MTSNPHLNPGPR, MGHNINIPRTPL, LSTPLPYDMRRS,
- 10 MTRIQDSPYDLR, MSTPPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSLPQ, MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIPHIPSSIG, CICRGVGCCLLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS, AQAMANPLGSHI, SSRIPGFDPDLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLQMTPPTPLL, THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPPRP, MMPPPTSLPSPS, LAQNPIYRAHPH,
- 15 MQPRPQTLTPAS, LTVVPVVSFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHITLSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, wherein said targeting peptide delivers the pharmaceutical agent for uptake by a target cell.

40. A method according to claim 39 wherein said targeting peptide comprises an
- 20 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

41. A method according to claim 39 wherein said targeting peptide comprises an
- 25 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS, GILSPSH and MSPPGPA or a derivative thereof.

42. A method according to claim 39 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

5 43. A method according to claim 39 wherein said targeting peptide is up to 100 amino acids long.

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